

"In the undulating region of Travancore, where the water-bearing strata heave and fall according to the locality concerned, I have come across a set of professional men who are generally consulted by those who wish to sink wells in view to ascertain whether, at a given spot, a well may be sunk with the probability of finding water *near enough*. These professional men undertake to predict where the springs will be found near, and where they will be found at great depth, and their predictions are generally verified with great accuracy. I took some trouble to ascertain how these men are enabled to predict the proximity, or otherwise, of the springs underground. Brushing aside the ceremonies and incantations they perform in view to deceive others and perhaps themselves also, I found that they detect the proximity of the subterranean springs by lying down on the bare ground in the dead silence of night, with the ear in contact with the ground, and trying to hear the sound of the flow of water in the strata beneath. By practice the ear is made very sensitive, and the degree of distinctness with which they hear the sound of flowing water enables them approximately to predict the depth of the springs. It is in this manner that appropriate spots are selected for sinking wells.

"Now, would any of the instruments you are experimenting with magnify the sound of the subterranean flow of water so as to greatly facilitate the process I have described? If so, it may be a considerable practical gain."

To this query I have hitherto been able to return no other answer than a negative one. Both the subjects are practical ones, and I only hope that there will be before long some light cast upon them.

THOS. S. TAIT

Baroda, India, November 4

Leaf-Sheaths and the Growth of Plants

THE latest results of M. Bert's researches into the growth of plants (see *Comptes Rendus*, vol. 87, p. 695, November 4), have led me to publish an observation which I made on the inner sheaths of young leaves this last spring. The spring before last I was struck with the crimson-like colour of these silky sheaths on many trees, whereas the young leaves they cover are of a tender green, and it naturally occurred to me that their purpose was not only to form a wrapper to the leaf, but also a coloured screen, which would allow the red rays of the spectrum to pass, and to a certain extent quench the blue rays. But I could not understand why the latter rays should be cut off, since they are highly actinic, and the leaves themselves are green. Last spring I carefully noted the tints of the leaf-sheaths of different trees, with the following results:—

Name of Tree.	Tint of Inner Leaf Sheath.	Tint of Outer Leaf Sheath.
Elm	Red (crimson)	Reddish-brown.
Lime	Red (crimson)	Reddish-brown.
Beech	Red (crimson)	Brown.
Sycamore	Red (crimson).	
Ash	Sooty-black.
Horse-chestnut ...	Red (crimson).	
Maple	Bright-red.	
Birch	Brown.	
Oak	Brownish-red.	
The Bramble ...	Reddish.	
The Hawthorn ...	Red.	
Certain Roses ...	Red.	
Wild Cherry ...	Red.	

Sometimes the bark on the stem of young sycamore shoots and the top leaflets were tinged with a deep reddish-brown. The overlapping tips of young leaves in buds were frequently reddish, and the majority of outer leaf-cases were a warm or reddish-brown. The shining buds of the horse-chestnut afforded a fine example of the phenomenon. The leaf-cases were of a strong red, like carmine, the exposed tip of each sheath leaflet being dyed a deeper red at the middle, shading off to the edges, where they overlapped. Under this protective curtain was a layer of flossy fibre, like cotton, swathing the pale young leaves underneath.

The recent researches of M. Bert throw light on this interesting subject. He finds that plants kept under green glass shades soon perish, because these intercept the red or less refrangible rays of the spectrum, and allow the blue or more refrangible rays to pass. Red glass, on the contrary, sustains life, although it becomes enfeebled by reason of the withdrawal of all the blue

rays. M. Bert thinks that all the rays are necessary to the full vigour of the plant, and in the proportion of the solar spectrum; but it would appear from the care which nature has taken to redden the young leaf-cases, that for certain trees at least, the spring sunlight is richer in blue rays than she wishes, and therefore she has arranged that part of them shall be excluded, while all the red rays (or those which affect the maximum reduction of carbonic acid gas, and the building up of tissues) are allowed to pass into the leaf. I should add that this effect of colour is evidently superadded to the other functions of the sheath, as it usually appears as a more or less perfect colouring of the *outer surface* of the sheath only.

JOHN MUNRO

West Croydon

Hornets

THE following fact, which I have been enabled to verify concerning a hornet, may be interesting to some of the readers of NATURE:—In a letter I received from my grandson, a very observing and accurate young naturalist, there was the following statement, dated October 13, 1878, Tunbridge Wells:—

"Last week I caught a splendid large hornet on the hall window, and last Saturday I caught a smaller one on a small oak-tree in Hurst Wood (Tunbridge Wells). He was engaged in eating some sticky, whitish stuff which had come out of the tree in several places where it had been cut or bruised. This stuff seemed to attract all the insects in the neighbourhood, especially swarms of flies. There were two red admirals (butterflies), two hornets, four wasps, and hundreds of bluebottles and other small flies, busily engaged in eating this substance, which was bored with small round holes. On Sunday, as we came home from Speldhurst Church, we passed the same tree, and on it, to my great surprise, I caught half a hornet, which was very active, running about the tree, and seemed to be quite happy and comfortable. He had no abdomen at all, except a small piece of the upper skin, which hung on; his left wings were very much battered, and he had lost his left hind leg." This half hornet was brought home and examined, keeping actively alive until the evening, when it was destroyed for the sake of preservation. I had an opportunity of examining the half hornet alluded to very soon after, and the facts detailed in the letter I have quoted were ascertained to be quite correct. This hornet was a small specimen, and I found all the abdomen gone except a small portion of the upper part of the first joint, which still remained attached to the thorax. The left wings were much broken, and one hind leg gone. In this disabled state, how long the hornet might have lived is a point which I regret was not ascertained.

Raystead, Worthing

WM. WILSON SAUNDERS

Equine Sagacity

A PLEASANT story has just come to us from the Cape of Good Hope. In Graaf-Reinet, as in all the old Dutch towns in the colony, there is, in the centre of the place, a large market square, where the farmers, traders, and others, arriving with their produce at any hour of the day or night, may "out-span" the oxen or horses from their waggons, send the cattle out to the "commonage" to feed, while they bivouac at their waggons, as is the wont of African travellers to do, until the eight o'clock morning market auction.

An old horse belonging to one of these parties had wandered about in search of grass and water—vainly, no doubt, for it was during the severe drought from which the country is but now recovering. Coming to the great bare market-place, and finding a knot of men talking there, he singled out one of them, and pulled him by the sleeve with his teeth. The man, thinking the horse might possibly bite, repulsed him, but as it was not very roughly done, he returned to the charge, with the same reception; but he was a persevering animal, and practically demonstrated the axiom that "perseverance gains the day," for upon his taking the chosen sleeve for the third time between his teeth, the owner awoke to the idea that a deed of kindness might be required of him; so, putting his hand upon the horse's neck, he said, "All right, old fellow; march on!" The horse at once led the way to a pump at the further side of the square. Some coloured servants were lounging about the spot. One of them, at the bidding of the white man, filled a bucket with water; three times was the bucket replenished and emptied before the "great thirst" was assuaged, and then the grateful brute almost spoke his thanks to his white friend by rubbing his

nose gently against his arm, after which he walked off with a great sigh of relief.

A story somewhat analogous to the foregoing was told me by a friend, whose uncle, an old country squire in one of our western counties, had a favourite hunter in a loose box in the stable. One warm summer day he was "athirst," and could get no water. He tried to draw the groom's attention to the fact, but without success. The horse was not to be discouraged; he evidently gave the matter consideration. The thirst was pressing. All at once he remembered that he always had a certain halter put upon his head when led to the water. He knew where it hung. He managed to unhook it from its peg, and carried it to the groom! who at once, in great admiration of the knowledgeable brute, rewarded him in the manner he desired.

M. CAREY-HOBSON

Colour-Blindness

DR. PRIOR's letter is almost entirely philological, and therefore does not come within my province. I have alluded to the colour-blind impression of white in my paper in the *Phil. Trans.* I should like to know more about the eyesight of the person who says he cannot distinguish snow.

The latter part of the first paragraph of my letter on p. 120 should run, "In pigments, neutral green appears to me gray."

December 14

W. POLE

Magnetic Storm, May 14, 1878

REFERRING to a letter from the Rev. S. J. Perry in *NATURE*, vol. xviii. p. 617, reporting the magnetic disturbances observed at Stonyhurst, Melbourne, and Shanghai, on May 14, it may interest your readers to learn that earth-current disturbances were also noted on the Persian Gulf cables from 4 P.M. (Kurrachee time) on the 15th up to 5 A.M. on the following day.

Unusually strong earth-currents were also observed on June 3 and 4, on the cables between Bushire and Kurrachee; the current-strength at 2.40 P.M. on the 3rd, and 12.20 A.M. on the 4th, being reported as equal to fourteen Daniell's cells.

Kurrachee, November 8

HENRY C. MANCE

"Measuring the Height of Clouds"

THE electric light promising to be of great intensity at a small cost, the thought occurred to me that it might be used with advantage for the purpose of ascertaining the height of clouds. For, supposing an electric lamp sending a beam of light to the clouds, the spot where the light meets the latter, will be more or less visible, and we are obviously able to determine trigonometrically the height of the cloud.

By using two lamps, or a lamp and two reflectors, we may easily find also the rate at which clouds travel, by bringing the plane, passing through the axes of the beams of light, parallel to the direction in which the clouds move, and by noting the time it takes a cloud to travel from one beam of light to the other, having, of course, determined also the actual distance between the two spots of light on the clouds.

The above refers to observations during the night only, but by making use of coloured light, or by bringing a substance in the carbons of the lamp, the spectrum of which is easily recognisable, we might probably be able to work also during day-time.

Kew

J. F. WILKE

The Weather

AFTER a week of unusually cold weather, the mean temperature having been 28°·5, and the wind constant from a northerly point, a thaw set in yesterday, and the wind became westerly, when immediately after sunset a rather unusual condition of weather occurred: viz., the rapid formation of a complete sheet of ice on the roads, though at the time, and till eleven P.M., the thermometer was 2° or 3° above the freezing-point.

As the sky was overcast at the time radiation cannot well account for it. Owing to the penetration of the cold, the surface must have retained a temperature considerably below 32° for some time after the air had become warmer and damper, so that the moisture was at once congealed.

Clifton, December 16

G. S. THOMSON

THE LAST EXPERIMENTS WITH THE 80-TON GUN

THE last experiments with the 80-ton gun at Woolwich deserve to be recorded, if only for the sake of showing that our scientific artillerists appear to be working in the proper channel. The last shot fired from the monster piece of ordnance was with the unprecedented charge of 460 lbs. of powder, and yet there was not so much strain upon the gun as that formerly exerted by charges one hundred lbs. less. The reason of this is in the main due to a change having been made in the character of the gunpowder employed; for whenever the former powder was used, even in lesser quantity, the pressure of the gas inside the gun rose at once. This would not so much matter if it could be shown that with the increase of strain, the work of the shot increased also. But such is not the case. For instance, in the case of two shots fired last week, one was sent on its way by 460 lbs. of prismatic powder, recording a velocity, we are told, of 1,626 per second, and a strain inside the gun of 19½ tons, while the other, with but 425 lbs. of cube powder, had a speed of only 1,600 feet, while it exerted a strain upon the weapon of 21 tons per square inch. The gun has been chambered—or in other words the cartridge cavity enlarged—to permit the introduction of heavier charges, as also to allow of a certain amount of air-space in the cartridge; but this modification in the weapon, beneficial as it may be, does not account, as we have shown, for the decrease upon the strain of the gun. This is due to the change in the powder.

In most of the former experiments a gunpowder of solid cubes, irregular in shape and measuring about an inch and a half, were employed; the recent results have been secured by thick six-sided prisms, about an inch across, and so accurately shaped that they may be packed together very closely. There is a single perforation in the middle of this prismatic powder, which, by the way, is of German origin, and when the cartridge has been securely packed so as to represent one solid mass, the perforations running through the whole length of the charge permit of the same being rapidly kindled. If the perforations were not there, half the charge would probably be expelled the gun before it was kindled; so that a packed cartridge of prismatic powder represents as nearly as possible a solid charge with tubes running its entire length, through which the kindling flames pass.

It has, of late, grown to be an axiom that the larger the gun the larger must be the grains of powder. A large grain of gunpowder burns slow because the fire is some time reaching the centre, and a slow-burning powder is what artillerists require for rifled guns. In a smooth-bore weapon the cannon ball fits loosely, and may be expelled at a bound; but in rifled cannon the shot, so to speak, moves upon a sort of railway, and it would never do to get the shot into motion too suddenly. An undue strain would be exerted upon the gun, while the velocity of the shot would not be increased. For a rifled gun, therefore, a slow-burning charge is absolutely necessary, and this is to be secured only by reducing the surface to be kindled. In the case of the prismatic powder, the grains, if they may be called by that name, are so closely packed that no fire can get between them, and hence the action of kindling is still further reduced.

Not only is the shape and density of powder grains now attracting particular attention, but the percentage of moisture contained in the material has also lately been under study. The amount of water in gunpowder to the minute extent existing in ordinary samples is found to influence combustion in a very marked degree, and nothing but an exhaustive series of trials can give sufficient data for practical application of so important an element in the science of explosives. In the meantime chemists are pointing out yet another source of uncertainty in the combustion of gunpowder, to which, notwithstanding